

THE INVENTION CLAIMED IS

1. In a solid oxide fuel cell operating at a temperature in the range of 400-700°C, the improvement comprising;
an anode including doped-ceria,
an electrolyte including doped-ceria, and a cathode including cobalt iron based materials.
2. The improvement of Claim 1, wherein said anode is composed of NiO/doped-ceria.
3. The improvement of Claim 1, wherein said doped-ceria includes doping elements selected from the group consisting of samarium oxide, gadolinium oxide, yttria oxide, and lanthanide oxide.
4. The improvement of Claim 1, wherein said fuel cell includes a pore former to create pores therein.
5. The improvement of Claim 4, wherein said pore formed is selected from the group consisting of starch and carbon.
6. The improvement of Claim 1, wherein said electrolyte comprises material selected from the group consisting of doped-ceria, doped-zirconia with a thin layer of doped-ceria, and doped-ceria/doped-zirconia.
7. The improvement of Claim 1, wherein said electrode is selected from the group consisting of (La, Sr)(Co Fe)O₃, and (La,Ca)(Co, Fe, Mn)O₃.
8. The improvement of Claim 1, wherein said doped-ceria in said electrolyte comprises colloidal spray deposited doped-ceria, or aerosol spray casting.
9. The improvement of Claim 1, wherein said cobalt iron based material is deposited by colloidal spray deposition or aerosol spray casting.

10. In a method for fabricating ceria-based solid oxide fuel cells, the improvement including forming the ceria-based material by colloidal spray deposition.

11. The improvement of Claim 1, additionally including forming an electrode of the fuel cells from a cobalt, iron, manganese based material by colloidal spray deposition.

12. A ceria-based solid oxide fuel cell including:
an anode containing doped-ceria,
an electrolyte containing doped-ceria,
an electrode containing cobalt iron based materials, and
a fuel selected from the group consisting of hydrogen, methane, methanol, propane, butane and other hydrocarbons

13. The fuel cell of Claim 12, operating in a temperature range of 400-700°C.

14. The fuel cell of Claim 12, wherein said fuel is composed of hydrogen or methane, and wherein the operating temperature is about 550°C.

15. The fuel cell of Claim 12, wherein said fuel is hydrogen, and wherein a power output of up to $400\text{mW}/\text{cm}^2$ is produced at an operating temperature of 550°C.

16. The fuel cell of Claim 12, wherein said fuel is methane, and wherein a power output of $320\text{mW}/\text{cm}^2$ is produced at an operating temperature of 550°C.

17. The fuel cell of Claim 12, wherein said anode comprises NiO/doped-ceria.

18. The fuel cell of Claim 17, wherein said electrolyte additionally includes doped-zirconia.

19. The fuel cell of Claim 18, wherein said electrode comprises (La, Sr)(Co, Fe, Mn) O₃.

20. The fuel cell of Claim 19, wherein said doped-ceria is doped with samarium oxide, yttria oxide, lanthamide oxide, or gadolinium oxide.